

## 'Night shades' thwart laser's blinding effects on Air Force warfighter

by Rudy Purificato, 311th Human Systems Wing

BROOKS AFB, TEXAS — New Air Force Research Laboratory developed and validated aircrew laser eye protection may soon earn the moniker 'night shades' for their ability to shield aviators from battlefield lasers at night time.

Clear laser eye protection for infrared spectacles is the latest generation of optical technology specifically designed to protect the force without restricting visibility.

"As the number of laser wavelengths increased, the dye [tinted lens technology] solution became unsatisfactory because it is too dark for nighttime operations," said Maj. Kent Harrington, AFRL's laser eye protection program manager for the Human Effectiveness Directorate's Optical Radiation Branch. "The Air Force began looking for a better solution that would still protect against the threat wavelengths, but allow pilots to perform their missions during night operations."

Dye technology used in tinted in-helmet visors and spectacles absorbs rather than reflects laser light.

"The Barnes visor was among the first protective devices we fielded that protected air crews from target designators and range finders," said Lt. Col. Leon McLin, Optical Radiation Branch chief.

"The Barnes visor protected air crews from laser exposure, but it had seriously restricted visibility," Harrington said of the device the Air Force has used since the mid-1980s that limited aircrews' ability to see cockpit instrumentation.

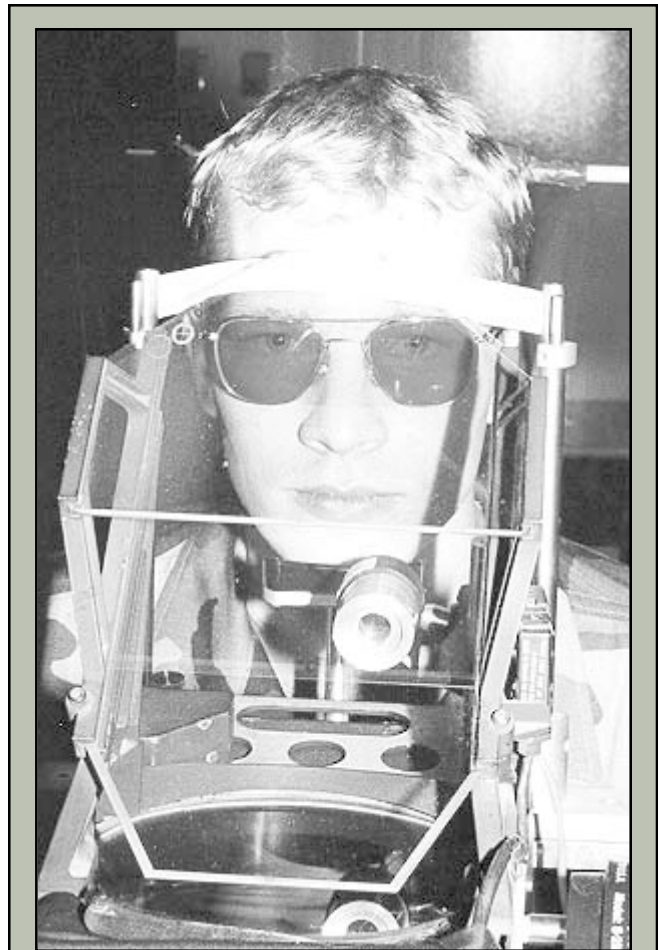
For decades AFRL's Optical Radiation Branch pursued pioneering laser eye protection research aided by a partnership with the U.S. Air Force School of Aerospace Medicine's Ophthalmology Department. The AFRL team had known about and worked with thin film deposition methods as a way of abating laser light.

"Dielectric stacks have been around for the last 20 years. It's commonly used as a coating on camera lenses and in glass optics. These stacks are multi-thin layers that interfere with laser light by reflecting specific wavelengths," Harrington said.

CLEPIR uses dielectric films stacked in alternating quarter wavelength layers, effectively weakening invisible "out of band" light in both infrared and ultraviolet frequencies.

"Pilkington [Optronics] is the only company that puts dielectric stacks on polycarbonate, which meets Air Force requirements for impact and shatter resistance," Harrington said.

AFRL scientists say CLEPIR is only an interim solution because it does not provide comprehensive laser eye protection based on its inability to block visible laser light.



**A WARFIGHTER'S NEW SHADES** — A representative from the laboratory wears clear laser eye protection for infrared spectacles. The eyewear is the latest generation of optical technology specifically designed to protect the force from battlefield lasers without restricting visibility.

Brooks acquisition specialists said this limitation could be overcome by using the new spectacles in combination with tinted helmet visors during daytime operations.

"Technology is evolving. We have to stay ahead. We've been working for the past three years on wrap-around [peripheral] laser eye protection," McLin said. CLEPIR does not provide wrap-around protection, but future generations of laser eye pro-

tection will feature it.

McLin and Harrington credit USAFSAM's Ophthalmology Department for developing the new aircrew spectacle frame for CLEPIR.

"These frames have improved nose pads, and integrate better with visors and gas masks. The eye wire used in the frames make the spectacles safer because it prevents the lenses from

popping out," McLin said.

The AFRL scientists said the next challenge is developing eyewear that protects against multiple laser wavelengths.

"It's called agile laser eye protection which responds to any laser wavelength," Harrington said. That technology is being developed now, but is about a decade away from becoming a reality. @